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(54) METHOD AND APPARATUS FOR SUPPLYING MOLTEN GLASS

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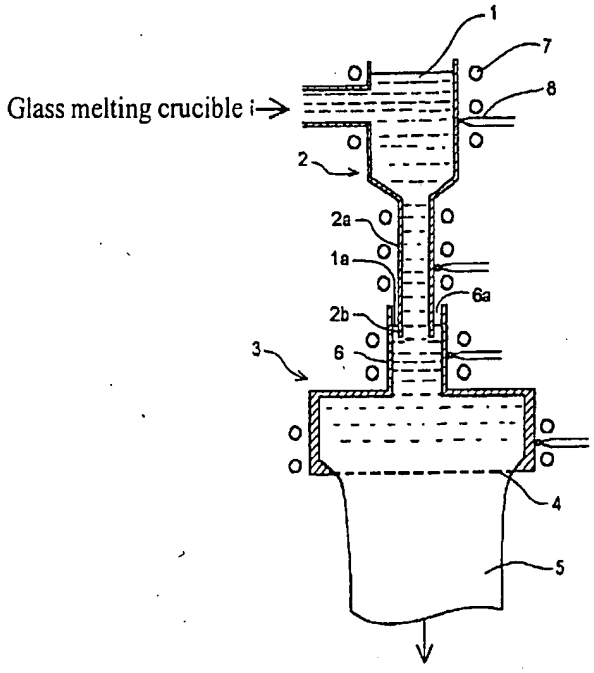
(57) ABSTRACT

PURPOSE: To provide a supply method and apparatus that can continuously mold molten glass in a stable size and state without changing the amount of molten glass flow, even if the temperature of the molding tank is changed.

SOLUTION MEANS: This apparatus of the present invention has a first tank 2, having an outflow tube pipe 2a at the bottom and that uniformly that heats molten glass 1 to a prescribed temperature, and a second tank 6 connected to a lower molding tank 3, with the lower end 2b of the outflow pipe 2a of the first tank 2 being disposed in an immersed state under a liquid surface 1a of the molten glass 1 in the second tank 6. Also, in the method of the present invention, when the molten glass 1 is uniformly heated to a prescribed temperature by the first tank 2 and the molten glass 1 is then supplied to the second tank 6 connected to he molding tank 3, the molten glass 1 is continuously supplied in a state in which the lower end 2b of the outflow pipe 2a of the first tank 2 is immersed under the liquid surface 1a of the molten glass 1 in the second tank 6.



CLAIMS

1. A method for supplying molten glass, characterized by the fact that in a method in which molten glass is uniformly heated to a prescribed temperature by a first tank having an outflow pipe at the bottom, then supplied to a second tank connected to a molding tank via the outflow pipe of the above-mentioned first tank, the molten glass is continuously supplied in a state in which the lower end of the outflow pipe of the above-mentioned first tank is immersed under the liquid surface of the molten glass in the above-mentioned second tank.

2. An apparatus for supplying molten glass, characterized by the fact that it has a first tank having an outflow pipe at the bottom and that uniformly heats molten glass to a prescribed temperature and a second tank connected to a lower molding tank; with the lower end of the outflow pipe of the above-mentioned first tank being disposed in an immersed state under the liquid surface of the molten glass in the above-mentioned second tank.

3. The apparatus for supplying molten glass of Claim 2, characterized by the fact that the first tank, the outflow pipe, the second tank, and the molding tank have respective independent heating means and temperature sensors; provided with temperature regulators, which are connected to each temperature sensor and that can respectively, independently, and automatically control the temperature of the internal molten glass by each heating means.

DETAILED EXPLANATION OF THE INVENTION

[0001]

TECHNICAL FIELD OF THE INVENTION

The present invention pertains to a method and apparatus for supplying molten glass in continuously a molding glass product such as sheet glass from the molten glass.

[0002]

PRIOR ART

In general, when a glass product is continuously molded, for example, when thin sheet glass is manufactured, a glass raw material is dissolved in molten glass by a glass melting crucible, and the molten glass is cleaned and sufficiently stirred. After the temperature is lowered to the vicinity of a temperature suitable for molding, as shown in Figure 3, molten glass 1 is uniformly heated to the vicinity of a temperature suitable for molding in a first tank 2 equipped with an outflow pipe 2a at the bottom, and is supplied via a molding tank 3 through the outflow pipe 2a. In the molding tank 3, the molten glass 1 regulated to the molding temperature is drawn out of a glass discharge port 4 with an approximately rectangular shape, with sheet glass 5 being continuously molded.

[0003]

In the conventional apparatus for supplying molten glass, the molten glass 1 of the first tank 2 is directly supplied to the molding tank 3 by the outflow pipe 2a.

[0004]

PROBLEMS TO BE SOLVED BY THE INVENTION

However, when the temperature of the molding tank 3 is raised or lowered to adjust the size, such as the thickness of the sheet glass 5, since the temperature of the molten glass 1 being supplied from the outflow pipe 2a is also changed and the amount of flow of the molten glass 1 being drawn out of the glass discharge port 4 is changed, the entire cross-sectional size of the sheet glass 5 is changed, so that the size of the sheet glass 5 is deviated from the range of good-quality products. If the set temperature of the molten glass 1 in the outflow pipe 2a is changed to correct the change in the amount of flow, good-quality sheet glass 5 cannot be obtained until the amount of flow is a steady state.

[0005]

The purpose of the present invention is to provide a method and apparatus for supplying molten glass in which the above-mentioned problems are solved.

[0006]

MEANS TO SOLVE THE PROBLEMS

The method for supplying molten glass of the present invention is characterized by the fact that when molten glass is uniformly heated to a prescribed temperature by a first tank having an outflow pipe at the bottom, then supplied to a second tank connected to a molding tank from the outflow pipe of the above-mentioned first tank, the molten glass is continuously supplied in a state in which the lower end of the outflow pipe of the above-mentioned first tank is immersed under the liquid surface of the molten glass in the above-mentioned second tank.

[0007]

Also, the apparatus for supplying molten glass of the present invention is characterized by the fact that it has a first tank, having an outflow pipe at the bottom and uniformly heats molten glass to a prescribed temperature, and a second tank connected to a lower molding tank; the lower end of the outflow pipe of the above-mentioned first tank is disposed in an immersed state under the liquid surface of the molten glass in the above-mentioned second tank.

[0008]

Furthermore, the apparatus for supplying molten glass of the present invention is characterized by the fact that the first tank, outflow pipe, second tank, and molding tank have respective independent heating means and temperature sensors; temperature regulators, which are connected to each temperature sensor and can respectively, independently, and automatically control the temperature of the internal molten glass by each heating means, are provided.

[0009]

In the above-mentioned constitution, the amount of the molten glass flowing down in the outflow pipe at the bottom of the first tank is determined by the height from the liquid surface of the molten glass of the first tank to the liquid surface of the molten glass in the second tank, that is, the head height and the viscosity interlocked with the temperature of the molten glass flowing down in the outflow pipe. In the present invention, in order to allow the molten glass to constantly flow down in the outflow pipe, it is important that the outflow pipe and the molding tank are cut off and that the second tank for generating the liquid surface of the molten glass is interposed, so that the temperature of the molten glass flowing down in the outflow pipe is

constantly maintained, even if the temperature of the molding tank is changed. Also, in detaining a constant temperature of the molten glass in the outflow pipe, it is preferable to have a small heat transfer area of the outflow pipe and the second tank.

[0010]

OPERATION

According to the present invention, the apparatus for supplying molten glass is equipped with a first tank, having an outflow pipe at the bottom and uniformly heats the molten glass to a prescribed temperature, and a second tank connected to the lower molding tank, with the lower end of the outflow pipe of the first tank being disposed in a state in which it is immersed under the liquid surface of the molten glass in the second tank. When the molten glass is uniformly heated to a prescribed temperature in the first tank and is then supplied to the second tank via the outflow pipe of the first tank, since the molten glass is continuously supplied in a state in which the lower end of the outflow pipe of the first tank is immersed under the liquid surface of the molten glass in the second tank, if the temperature of the molding tank is raised, the amount of flow of the molten glass being molded is temporarily increased, so that the liquid surface of the molten glass in the second tank is lowered. Thereby, the amount of flow of the molten glass being molded is reduced, and the increase in the amount of flow is prevented. On the other hand, if the temperature of the molding tank is lowered, the amount of flow of the molten glass being molded is temporarily decreased, so that the liquid surface of the molten glass in the second tank is raised. Thereby, the amount of flow of the molten metal being molded is increased, and the decrease in the amount of flow is prevented. Therefore, even if the temperature of the molding tank is changed, the amount of flow of the molten glass can be constantly maintained.

[0011]

Also, in the apparatus for supplying molten glass of the present invention, the first tank, the outflow pipe, the second tank, and the molding tank have respective and independent heating means and temperature sensors; temperature regulators, which are connected to each temperature sensor and can respectively, independently, and automatically control the temperature of the internal molten glass by each heating means, are provided. Thus, even if the temperature of the molding tank is changed, the temperature of the first tank, the outflow pipe, the second tank, and the molding tank is independently, and automatically controlled, so that the temperature of the molten glass in each tank, as well as the viscosity are constantly maintained. Thereby, the amount of flow of the molten glass can be further stabilized.

[0012]

EMBODIMENT OF THE INVENTION

Figure 1 is an illustrative diagram showing an application example of the present invention. In Figure 1, 1 is molten glass, 2 is a first tank, 2a is an outflow pipe connected to the bottom of the first tank 2, 3 is a molding tank, 4 is a glass discharge port with an approximately rectangular shape, 5 is sheet glass, 6 is a second tank, 7 is a heating element used as a heating means, and 8 is a thermocouple used as a temperature sensor. The same numerals are respectively given to the same parts of the above-mentioned Figure 3.

[0013]

First, an example of the apparatus for supplying molten glass of the present invention is explained.

[0014]

The supply apparatus of the present invention, as shown in Figure 1, is equipped with a first tank 2, having an outflow pipe 2a at the bottom and uniformly heats the entire molten glass 1 to a temperature higher than the molding temperature by a prescribed level, and a second tank 6 connected to the molding tank 3 and has an insertion port 6a, with a lower end 2b of the outflow pipe 2a being inserted into the insertion port 6a of the second tank 6. When the supply apparatus is operated, the lower end 2b of the outflow pipe 2a is immersed under a liquid surface 1a of the molten glass 1 in the second tank 6. The molten glass 1, which is supplied to the molding tank 3 from the second tank 6 and regulated to the molding temperature, is drawn out of roller pairs (not shown in the figure) from a glass discharge port 4 with an approximately rectangular shape, and sheet glass 5 with a desired size shape is continuously molded.

[0015]

Also, the first tank 2, outflow pipe 2a, second tank 6, and molding tank 3 respectively have independent heating elements 7 and thermocouples 8; temperature regulators (not shown in the figure), which are connected to each thermocouple 8 and can respectively, independently, and automatically control the temperature of the internal molten glass 1 by each heating element 7, are provided.

[0016]

Next, an example of the method for supplying molten glass of the present invention is explained.

[0017]

In the supply method of the present invention, first, a glass raw material is heated to about 1,600°C or higher by a glass melting crucible (not shown in the figure) and formed into molten glass. Bubbles and foreign matter are removed by cleaning the molten glass, then the molten glass is sufficiently stirred to eliminate pulsation. Its temperature is lowered to the vicinity of about 1,200°C, being a range in which the viscosity of the molten glass is 10^4-10^5 poise. The molten glass set to a prescribed temperature, as shown in Figure 1, is supplied to the first tank 2 equipped with the outflow pipe 2a, then the entire molten glass 1 is uniformly heated. When the molten glass 1 is supplied to the second tank 6 through the outflow pipe 2a, it is supplied in a state in which the lower end 2b of the outflow pipe 2a is immersed under the liquid surface 1a of the molten glass 1. The molten glass 1 supplied into the molding tank 3 from the second tank 6 is regulated to a molding temperature such as 1,150°C, having a viscosity of about 10^5 poise suitable for molding, with the molten glass 1 set to the molding temperature being continuously drawn out of the glass discharge port 4 with an approximately rectangular shape by a drawing means such as roller pairs (not shown in the figure), then molded into sheet glass 5 with the desired size and shape.

[0018]

When the sheet glass 5 is continuously molded from the above-mentioned supply apparatus, if the temperature of the glass discharge port 4 with an approximately rectangular shape opened to the bottom of the molding tank 3 is changed by 5°C, for instance, to adjust the cross-sectional shape, warp, etc., of the sheet glass 5, the change on the sectional area of the sheet glass 5 is within 0.5%, and the sheet glass 5 does not deviate from thick good-quality product standards.

[0019]

On the contrary, when the temperature of the glass discharge port 4 of the molding tank 3 in the conventional apparatus for supplying molten glass was changed by 5°C, the amount of molten glass flow was changed, and the change in the cross-sectional area of the sheet glass 5 reached about 3.5%, so that the sheet glass 5 deviated from the thick good-quality product standards. Accordingly, the change in the amount of flow was corrected by changing the set temperature of the molten glass 1 in the first tank 2 and the outflow pipe 2a, but about 90 min

was required until the amount of flow reached a steady state, and the sheet glass 5 was formed as a cullet.

[0020]

Also, as shown in figure 2, the present invention can be applied to an overflow method that supplies the molten glass 1 to an overflow groove 9a formed at the upper part of a molded body 9 with an approximate wedge shape as a cross-sectional shape, overflows the molten glass 1 from overflow groove 9a to both sides of the molded body 9, cools it to the molding temperature by flowing down the side wall surfaces 9b of both sides of the molded body 9, fuses and joins each molten glass 1 at a lower peak 9c of the molded body 9, and continuously molds one sheet glass 5. In this case, when the molten glass 1 is supplied to the first tank 2 having the outflow pipe 2a at the bottom and uniformly heated to the vicinity of a temperature suitable for molding, and with the molten glass 1 then being supplied to the second tank 6 connected to the overflow groove 9a of the lower molded body 9, the molten glass 1 is continuously supplied in a state in which the lower end 2b of the outflow pipe 2a of the second tank 2 is immersed under the liquid surface 1a of the molten glass 1 in the second tank 6.

[0021]

Iin the above-mentioned embodiment of the present invention, molding of sheet glass has been shown; however, without being limited to this, the present invention can also be applied to the molding of tubular bodies, rod-shaped bodies, etc.

[0022]

EFFECTS OF THE INVENTION

According to the present invention, with the above-mentioned constitution, even if the temperature of molten glass flow is changed, the amount of molten glass flow is not changed, and the molten glass can be continuously molded in a stable size and state.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is an illustrative diagram showing the apparatus for supplying molten glass of the present invention.

Figure 2 is an illustrative diagram showing another apparatus for supplying molten glass of the present invention.

Figure 3 is an illustrative diagram showing an apparatus for supplying molten glass, using a conventional technique.

EXPLANATION OF NUMERALS:

1	Molten glass
1a	Liquid surface
2	First tank
2a	Outflow pipe
2b	Lower end
3	Molding tank
4	Glass discharge port
5	Sheet glass
6	Second tank
6a	Insertion port
7	Heating element
8	Thermocouple
9	Molded body

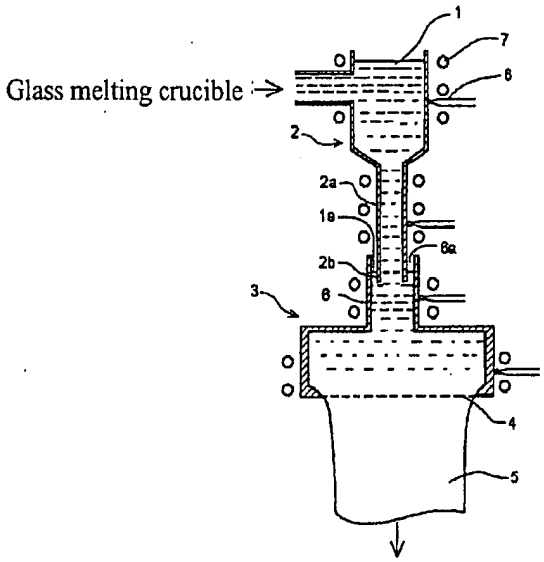


Figure 1

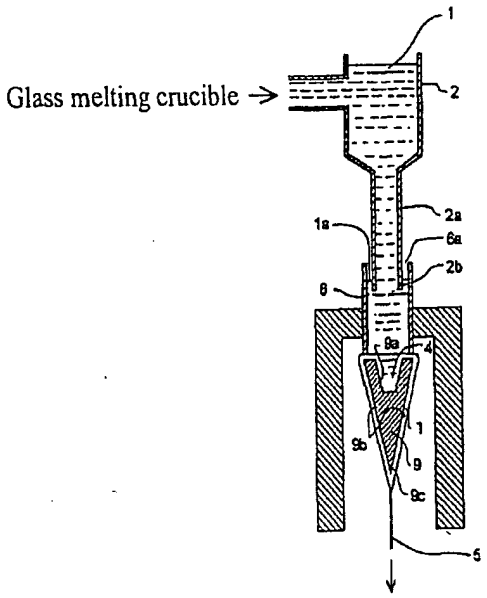


Figure 2

EUROPEAN PATENT OFFICE

Patent Abstracts of Japan

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APPLICANT : NIPPON ELECTRIC GLASS CO LTD;

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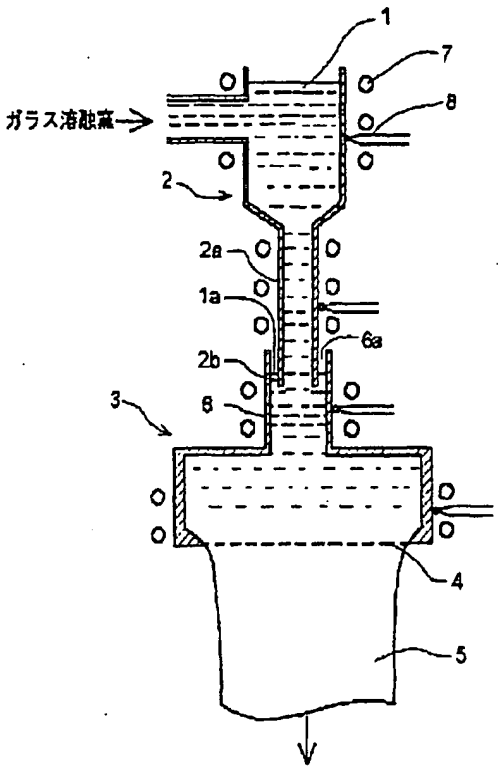
TITLE : SUPPLY METHOD AND SUPPLY DEVICE FOR MOLTEN GLASS



ABSTRACT : PROBLEM TO BE SOLVED: To provide a supply method and a supply device which are capable of continuously forming molten glass in a stabilized state of dimensions without changing the flow rate of the molten glass 1 even when the temperature of a lower forming vessel is changed.

SOLUTION: The device has a first vessel 2 which has an outflow pipe 2a at its bottom and soaks the molten glass 1 to a prescribed temperature and a second vessel 6 which is disposed successively at the lower forming vessel 3. The bottom end 2b of the outflow pipe 2a of the first vessel 2 is disposed in an immersion state under the liquid surface 1a of the molten glass 1 in the second vessel 6. Also, the method continuously supplies the molten glass 1 in the state of immersing the bottom end 2b of the outflow pipe 2a of the first vessel 2 under the liquid surface 1a of the molten glass 1 in the second vessel 6 when soaking the molten glass 1 at a prescribed temperature in the first vessel 2 and supplying the molten glass 1 to the second vessel 6 disposed successively from the forming vessel 3.

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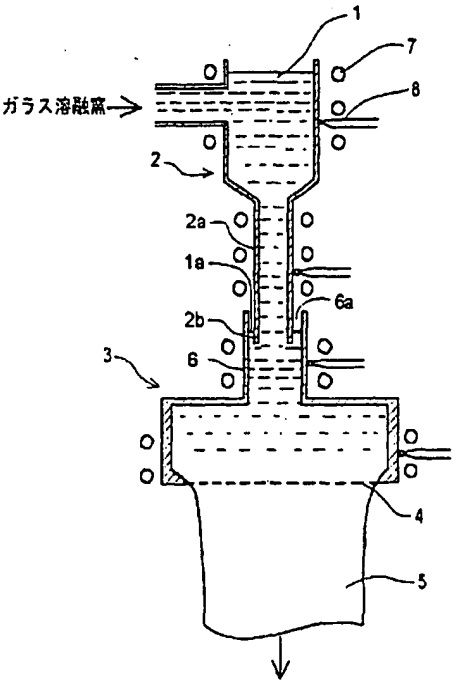
(54)【発明の名称】　溶融ガラスの供給方法および供給装置

(57)【要約】
【課題】　成形槽の温度を変化させた場合でも溶融ガラスの流量が変化せず、寸法が安定した状態で溶融ガラスを連続的に成形することができる供給方法および供給装置を提供する。
【解決手段】　本発明の装置は、底部に流出管２ａを有して溶融ガラス１を所定温度に均熱化する第一槽２と、下方の成形槽３に連設する第二槽６とを有し、第一槽２の流出管２ａの下端部２ｂを第二槽内６の溶融ガラス１の液面下１ａに浸漬状態で配設してある。また、本発明の方法は、溶融ガラス１を第一槽２で所定温度に均熱化し、次いで溶融ガラス１を成形槽３に連設する第二槽６に供給する際、第一槽２の流出管２ａの下端部２ｂを第二槽６内の溶融ガラス１の液面１ａ下に浸漬させた状態で連続的に溶融ガラス１を供給する。



【特許請求の範囲】

【請求項1】 溶融ガラスを底部に流出管を有する第一槽で所定温度に均熱化し、次いで前記第一槽の流出管より溶融ガラスを成形槽に連設する第二槽に供給する際、前記第一槽の流出管の下端部を前記第二槽内の溶融ガラスの液面下に浸漬させた状態で連続的に溶融ガラスを供給することを特徴とする溶融ガラスの供給方法。

【請求項2】 底部に流出管を有して溶融ガラスを所定温度に均熱化する第一槽と、下方の成形槽に連設する第二槽とを有し、前記第一槽の流出管の下端部を前記第二槽内の溶融ガラスの液面下に浸漬状態で配設してなることを特徴とする溶融ガラスの供給装置。

【請求項3】 第一槽、流出管、第二槽及び成形槽が、それぞれ独立した加熱手段及び温度センサを有し、各温度センサに接続され各加熱手段により内部の溶融ガラスの温度をそれぞれ独立して自動制御可能な温度調節器を備えたことを特徴とする請求項2に記載の溶融ガラスの供給装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は板ガラス等のガラス物品を溶融ガラスから連続的に成形する際の溶融ガラスの供給方法および供給装置に関する。

【0002】

【従来の技術】一般に、ガラス物品を連続的に成形する場合、例えば、薄い板ガラスを製造する際、ガラス溶融窯でガラス原料を加熱して溶融ガラスに溶解し、溶融ガラスを清澄し、十分に撹拌して成形に適した温度付近まで温度を低下させた後、図3に示すように、溶融ガラス1を、底部に流出管2aを備えた第一槽2内で成形に適した温度付近に均熱化した後、流出管2aを通じて成形槽3に供給する。成形槽3では、成形温度に調節された溶融ガラス1が略矩形状のガラス引出口4から引き出されて板ガラス5を連続的に成形している。

【0003】従来の溶融ガラスの供給装置では、第一槽2の溶融ガラス1は流出管2aで成形槽3に直接供給されるようになっている。

【0004】

【発明が解決しようとする課題】しかしながら、板ガラス5の肉厚等の寸法を調整するために成形槽3の温度を上昇または下降させた場合、それに伴って流出管2aから供給される溶融ガラス1の温度も変化してガラス引出口4から引き出される溶融ガラス1の流量が変化するので、板ガラス5の断面寸法全体が変化して板ガラス5の寸法が良品の範囲から逸脱する。その流量変化を補正するために第一槽2あるいは流出管2a内の溶融ガラス1の設定温度を変更すると流量が定常状態になるまでのしばらくの間、良品の板ガラス5が得られないという問題点がある。

【0005】本発明の目的は、上記の問題点を解決した溶融ガラスの供給方法および供給装置を提供することである。

【0006】

【課題を解決するための手段】本発明に係る溶融ガラスの供給方法は、溶融ガラスを底部に流出管を有する第一槽で所定温度に均熱化し、次いで前記第一槽の流出管より溶融ガラスを成形槽に連設する第二槽に供給する際、前記第一槽の流出管の下端部を前記第二槽内の溶融ガラスの液面下に浸漬させた状態で連続的に溶融ガラスを供給することを特徴とする。

【0007】また、本発明の溶融ガラスの供給装置は、底部に流出管を有して溶融ガラスを所定温度に均熱化する第一槽と、下方の成形槽に連設する第二槽とを有し、前記第一槽の流出管の下端部を前記第二槽内の溶融ガラスの液面下に浸漬状態で配設してなることを特徴とする。

【0008】さらに、本発明の溶融ガラスの供給装置は、第一槽、流出管、第二槽及び成形槽が、それぞれ独立した加熱手段及び温度センサを有し、各温度センサに接続され各加熱手段により内部の溶融ガラスの温度をそれぞれ独立して自動制御可能な温度調節器を備えたことを特徴とする。

【0009】上記構成において、第一槽の底部の流出管中を流下する溶融ガラスの流量は、第一槽の溶融ガラスの液面から第二槽内の溶融ガラスの液面までの高さ、即ち、ヘッド高と、流出管中を流下する溶融ガラスの温度に連動する粘度によって決まる。本発明では、流出管中を流下する溶融ガラスの流量が一定になるように、流出管と成形槽とを切り離して溶融ガラスの液面が生じる第二槽を介在させることにより、成形槽の温度を変化させた場合でも流出管を流下する溶融ガラスの温度を一定に維持することが重要である。また、流出管内の溶融ガラスの温度を一定に維持する上で、流出管と第二槽との伝熱面積を小さくしておくことが好ましい。

【0010】

【作用】本発明によれば、溶融ガラスの供給装置が底部に流出管を有して溶融ガラスを所定温度に均熱化する第一槽と、下方の成形槽に連設する第二槽とを有し、第一槽の流出管の下端部を第二槽内の溶融ガラスの液面下に浸漬状態で配設してあり、溶融ガラスを第一槽で所定温度に均熱化し、次いで第一槽の流出管より溶融ガラスを第二槽に供給する際、第一槽の流出管の下端部を第二槽内の溶融ガラスの液面下に浸漬させた状態で連続的に溶融ガラスを供給するので、成形槽の温度を上昇させた場合、成形される溶融ガラスの流量が一時的に増加して、第二槽内の溶融ガラスの液面が低くなり、それにより成形される溶融ガラスの流量が減少して流量の増加が相殺される。一方、成形槽の温度を降下させた場合、成形される溶融ガラスの流量が一時的に減少して、第二槽内の溶融ガラスの液面が高くなり、それにより成形される溶

融ガラスの流量が増加して流量の減少が相殺される。このように、成形槽の温度を変化させても、溶融ガラスの流量を一定に維持することができる。

【0011】また、本発明の溶融ガラスの供給装置は、第一槽、流出管、第二槽及び成形槽が、それぞれ独立した加熱手段及び温度センサを有し、各温度センサに接続され各加熱手段により内部の溶融ガラスの温度をそれぞれ独立して自動制御可能な温度調節器を備えているので、成形槽の温度を変化させた場合でも、第一槽、流出管、第二槽の温度を独立して自動制御して各槽内の溶融ガラスの温度、即ち粘度を一定に維持することにより、溶融ガラスの流量をさらに安定化させることができるようになる。

【0012】

【発明の実施の形態】本発明の実施例の説明図を図1に示す。図において1は溶融ガラスを、2は第一槽を、2aは第一槽2の底部に接続された流出管を、3は成形槽を、4は略矩形状のガラス引出口を、5は板ガラスを、6は第二槽を、7は加熱手段として発熱体を、8は温度センサとして熱電対を各々示しており、前出の図3と同一部分には同一符号を付してそれぞれ示している。

【0013】まず、本発明に係る溶融ガラスの供給装置の一例を説明する。

【0014】本発明の供給装置は、図1に示すように、底部に流出管2aを有し、溶融ガラス1の全体を成形温度よりも所定温度高い温度に均熱化する第一槽2と、成形槽3に連設して挿入口6aを有する第二槽6とが、流出管2aの下端部2bを第二槽6の挿入口6aに挿入させた配置となっており、供給装置の稼働時には第二槽6内の溶融ガラス1の液面1a下に流出管2aの下端部2bが浸漬した状態になる。第二槽6から成形槽3に供給されて成形温度に調整された溶融ガラス1は、略矩形状のガラス引出口4からローラー対（図示せず）により引き出され、所望の寸法形状の板ガラス5が連続的に成形されるようになっている。

【0015】また、第一槽2、流出管2a、第二槽6、成形槽3は、それぞれ独立した発熱体7及び熱電対8を有し、各熱電対8に接続され各発熱体7により内部の溶融ガラス1の温度をそれぞれ独立して自動制御可能な温度調節器（図示せず）を備えている。

【0016】次に、本発明に係る溶融ガラスの供給方法の一例を説明する。

【0017】本発明の供給方法では、まず、ガラス溶融窯（図示せず）によりガラス原料を約1600℃以上に加熱して溶融ガラスに溶解し、溶融ガラスを清澄して気泡や異物等を取り除き、溶融ガラスを十分に撹拌して脈理をなくし、溶融ガラスの粘度が10^{4}～10^{5}ポイズの範囲になる温度付近、例えば、1200℃付近まで温度を低下させる。所定の温度になった溶融ガラスを、図1に示すように、流出管2aを備えた第一槽2に供給して溶融ガラス1全体を均熱化し、次いで流出管2aを通じて第二槽6に溶融ガラス1を供給する際、流出管2aの下端部2bを溶融ガラス1の液面1a下に浸漬させた状態で供給する。第二槽6から成形槽3内に供給された溶融ガラス1は、その粘度が成形に適した約10^{5}ポイズになる成形温度、例えば、1150℃に調節され、成形温度になった溶融ガラス1を略矩形状のガラス引出口4からローラー対（図示せず）等の牽引手段により連続的に引き出して所望の寸法形状の板ガラス5に成形する。

【0018】上記の供給装置により板ガラス5を連続的に成形している時に、板ガラス5の断面形状、反り等を調整するために成形槽3の底部に開口している略矩形状のガラス引出口4の温度を、例えば、5℃変化させた場合、板ガラス5の断面積の変化は0．5%以内であり、板ガラス5が肉厚の良品規格を外れることはない。

【0019】これに対して従来の溶融ガラスの供給装置で成形槽3のガラス引出口4の温度を5℃変化させた場合、溶融ガラスの流量が変化し板ガラス5の断面積の変化は約3．5%に達し、板ガラス5は肉厚の良品規格を外れた。そこで、第一槽2及び流出管2a内の溶融ガラス1の設定温度を変更して流量変化を補正したが、流量が定常状態になるまでに約90分も要し、その間の板ガラス5は全てカレットになった。

【0020】また、本発明は、直接ガラス引出口4から溶融ガラス1を引き出す成形に限らず、図2に示すように、断面が略くさび形の成形体9の上部に形成されたオーバーフロー溝9aに溶融ガラス1を供給し、溶融ガラス1をオーバーフロー溝9aの両側から溢れさせて成形体9の両側の側壁面9bを流下させ成形温度まで冷却した後、各々の溶融ガラス1を成形体9の下頂部9cで融合させ1枚の板ガラス5を連続的に成形するオーバーフロー法にも適用可能である。この場合、溶融ガラス1を底部に流出管2aを有する第一槽2に供給して成形に適する温度付近に均熱化し、次いで下方の成形体9のオーバーフロー溝9aに連設する第二槽6に溶融ガラス1を供給する際、第一槽2の流出管2aの下端部2bを第二槽6内の溶融ガラス1の液面1a下に浸漬させた状態で連続的に溶融ガラス1を供給する。

【0021】なお、上記発明の実施の形態では、板ガラスの成形に関して例示したが、これに限らず、本発明は、管状体、棒状体等の成形にも適応可能である。

【0022】

【発明の効果】本発明は、上記のような構成により、成形槽の温度を変化させた場合でも溶融ガラスの流量が変化せず、寸法が安定した状態で溶融ガラスを連続的に成形することができる実用上優れた効果を奏するものである。

【図面の簡単な説明】

【図1】本発明に係る溶融ガラスの供給装置の説明図。

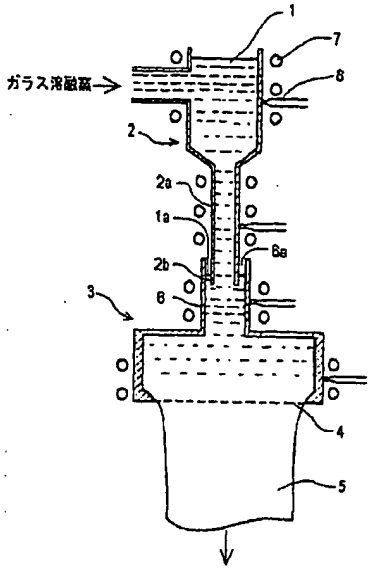
【図2】本発明に係る他の溶融ガラスの供給装置の説明図.

【図3】従来技術による溶融ガラスの供給装置の説明図.

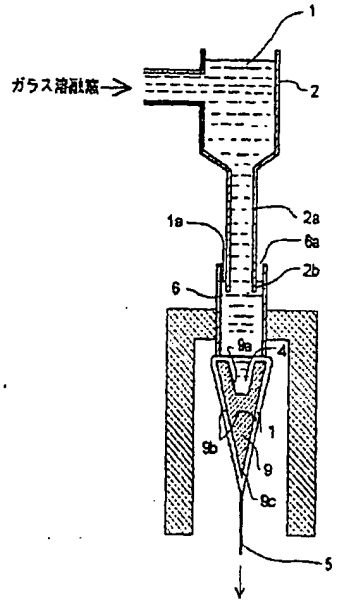
【符号の説明】

1　溶融ガラス
1a　液面
2　第一槽
2a　流出管
2b　下端部
3　成形槽
4　ガラス引出口
5　板ガラス
6　第二槽
6a　挿入口
7　発熱体
S　熱電対
9　成形体

【図1】



【図2】



【図3】